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ABSTRACT

Adult Basic Education (ABE) students with either no computer assisted education instruction (CAI) experience (NE group), and with a fifteen-minute introduction to CAI (CAI group) were given a 14-item questionnaire to determine their attitude toward CAI. Agreement or disagreement was elicited for statements comparing CAI to the teacher or other instructional media, or concerning technical aspects of computer use, work requirements, and general feelings toward the machine. The overall attitude of the NE group was slightly positive, while the CAI group was decidedly positive. Many of the uncertainties concerning working speed and technical aspects of the computer use were reduced or eliminated by the orientation. All the students, however, expressed the need for the teacher. The results of this study show that students are, in spite of certain anxieties, eager to use CAI. Teachers in ABE were thus encouraged to use computer aided instruction, the great benefits of which are only starting to be realized. (Author/PT)

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Adult Basic Education

# Attitudes of Adult Basic Education Students Toward Computer-Aided Instruction

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## Abstract

Adult basic education students with either no CAI experience (NE group) or a fifteen-minute introduction to CAI (Exp. group) were given a 14-item questionnaire to determine their attitude toward CAI. Agreement or disagreement was elicited for statements comparing CAI to the teacher or other instructional media, or concerning technical aspects of computer use, work rate requirements, and general feelings toward the machine.

The overall attitude of naive students (NE group) was slightly positive; the 15-minute experience at the console significantly improved attitudes, making them decidedly more positive. Many of the uncertainties concerning working speed and technical aspects of computer use were reduced or eliminated by the orientation. All students, however, expressed a need for the teacher.

The results of this study show that students are, in spite of certain anxieties, eager to use CAI. Anxieties are for the most part markedly decreased by a brief session at the console. Teachers in ABE are thus encouraged to use computer-aided instruction, whose great benefits to education are only starting to be realized.

# Attitudes of Adult Basic Education Students Toward Computer-Aided Instruction[1]

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Beginning with the Adult Education Act of 1966, the American educational system has seriously concerned itself with the under-educated adult. Today, considerable attention is being paid to this educationally deprived individual, the adult who has either dropped out of school or who has attended a school so inferior that it has failed to provide an even barely adequate education. The reason for this attention is that the result of an early departure from school, or a grossly inferior education, is often illiteracy.

For years most Americans believed that illiteracy was a problem of underdeveloped countries alone, but certainly not an American problem. We have discovered, however, that it is an American problem, and that there are, in fact, several million of us who may be described, at best, as functionally illiterate. Since literacy is a prerequisite for virtually any kind of employment (especially in urban areas), as well as for social dexterity, the need for educating the disadvantaged adult is an urgent one.

Unfortunately, the education of adults is generally a difficult task (see Knowles, 1967): the teaching of basic mathematical and

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[1]The assistance of Mr. Daniel Marchand, who administered the questionnaire, is gratefully acknowledged.

language arts skills is particularly difficult (Ulmer, 1969). Although it is obvious that adults in the classroom cannot be treated like children, there are very few teachers trained specifically to teach adults. Teacher-training programs are certainly needed, but this will take time. Something is needed now.

Perhaps educational technology is the answer to this need. Whereas almost all teachers have been specifically trained only in the teaching of children and teenagers (interestingly, college teachers generally receive no instruction in the art of teaching), the creators and implementers of educational technology have most often been psychologists with an interest in general principles of learning. Proponents of programmed instruction (PI) or computer-aided instruction (CAI) point out the wide range of uses for their techniques. Bookstores abound with programmed texts for adults as well as children, and many companies use PI or CAI extensively in training programs. But, perhaps, there is an even greater need for self-instructional materials in adult basic education (ABE), for it is here that the shortage of well-qualified teachers is most pronounced. And there seem to be particular reasons that computer-aided instruction might be the preferable form of self-instruction in ABE.

First, CAI is the best method for giving students immediate feedback and reward. In their evaluation of ABE materials and programs, Barnes and Hendrickson (1965) found that one of the most important objectives in teaching undereducated adults was "devising ways so that immediate rewards can be experienced by the learner

during this process" (p. 7). Later in their report they discuss programmed instruction and find it wanting ("A person who cannot read can make only very limited use of silent feedback devices," p. 66). They conclude that "computers, control of visual and auditory feedback, could conceivably accomplish the requirements that need to be met for programmed learning in fundamental education programs" (p. 66).
The great success of the Stanford Project: CAI in Initial Reading (see Atkinson and Wilson, 1969), which leans heavily on an audio component, illustrates the advantage of CAI over PI for teaching basic reading skills.

Second, the computer is a major element in the new business technology. Hands-on experience with a modern electronic device could make the undereducated adult immediately feel that he is relating to today's highly automated world.

Third, good CAI programs are teacher-proof. There is a wide variation in teacher ability and success in teaching the disadvantaged, and, hence, there is a real need for materials whose effectiveness is more or less independent of the teacher. In the hands of a good teacher, such materials are a useful supplement; in the hands of a bad teacher, they are a necessity.

But the skilled ABE teacher is very sensitive to his students' fears and anxieties (Ulmer, 1969). He may feel that the computer console will overawe students and that it might take a good deal of time for the student to become accustomed to and comfortable with it. College students show a positive attitude toward CAI, even prior to

experience with it (see Mathis, Smith, and Hansen, 1970), but the attitudes of ABE students cannot be predicted from results obtained with such a different population. How does the adult basic education student initially react to the computer console? Is he altogether enthusiastic, or does he have certain apprehensions? Is extensive experience at the console necessary to relieve anxieties the student might have, or is a short orientation session sufficient?

These are important questions for any ABE teacher who considers the use of CAI. For the computer to be a valuable adjunct requires that the teacher be fully aware of the students' attitudes toward it. It was to assess these attitudes that this study was undertaken. A 14-item questionnaire, designed to indicate possible sources of anxiety connected to the computer, was administered to two groups of adult basic education students. In order to determine the possibly beneficial effects of minimal experience with the computer, one group was given a fifteen-minute hands-on introduction to the console prior to the questionnaire; the other, larger group of students received the questionnaire prior to any experience with the computer.

## Method

### Subjects

Forty-three subjects participated, of whom three were eliminated from consideration because of a failure to understand the questionaire. Thus, the data for 40 subjects was used.

All subjects were students in the General Studies program at the Opportunities Industrialization Center (OIC) in Roxbury, Massachusetts.

General Studies is an ABE program set up as part of CREATES, a federally-funded multi-agency demonstration project in adult basic education. Student ages ranged from 18 to 56. All were in need of remediation in basic skills (language arts and/or arithmetic) and 45 percent were illiterate or functionally illiterate.

Materials

A 14-item attitude questionnaire was administered to each subject. The questionnaire is presented in Table 1. (A fifteenth item -- No. 9 -- which asked about typewriter experience, was considered irrelevant to this study.)

Items were statements (e.g., I think students learn better by computer than with a teacher) to which students could indicate their agreement or disagreement by choosing one of three responses: Yes, No, or Maybe. For most of the items a Yes response reflected a positive attitude toward CAI, but for three of the items (Nos. 10, 11, and 14) a No response indicated a positive attitude. The direction of positiveness is shown in Table 1.

Design

There were two independent groups in the study. The first group, called Non-Experienced (NE), consisted of 27 subjects who had had no experience with the computer console prior to receiving the questionnaire. The second group, called Experienced (Exp.), had a brief (approximately 15-minute) trial at the console just prior to receiving the questionnaire.

Table 1

Scale of Attitudes Toward Computers
for Boston Students

Name: _____ Date _____

School or Center _____

| | | Positive Response |
|---|---|---|
| 1. | I would learn more quickly by using the computer. | Yes |
| 2. | I could work at my own speed on the computer. | Yes |
| 3. | It would be interesting to work by computer. | Yes |
| 4. | It would be easier to learn by computer than with a teacher. | Yes |
| 5. | I would like sitting and working alone. | Yes |
| 6. | I think students learn better by computer than with a teacher. | Yes |
| 7. | It would be easier to learn by computer than with films and slides. | Yes |
| 8. | I think students learn better by computer than with a book. | Yes |
| 10. | I'm afraid I could not learn how to use a computer very well. | No |
| 11. | I would need a teacher as I work on the computer. | No |
| 12. | I would like to use a computer. | Yes |
| 13. | Using a computer would be like having a friendly teacher. | Yes |
| 14. | Learning by computer would go too fast. | No |
| 15. | I would not mind if I missed a question while working on a computer since no one would be watching me. | Yes |

The reason for the smaller size of the Exp. group was the fact that the primary interest of the study was the CAI-naive student. All students who have had no experience at a console may be considered equal with respect to their experience; on the other hand, orientation procedures and their effect could differ from class to class.

Although chosen randomly, students in the Exp. group had a slightly lower median reading level than students in the NE group (3.6 vs. 5.0 by the ABLE test).

Procedure

For all subjects the questionnaire was administered individually. The experimenter read the items aloud as the student read silently (or listened); this was necessary in view of the low reading level of some of the students.

Subjects in the NE group (naive subjects) may have seen the console prior to receiving the questionnaire, but they were given no information about it, nor were they permitted to work with it. The subjects in the Experienced group were given, individually, a very brief explanation of CAI and then were permitted to actually go on the system for several minutes. For each student this entire introduction lasted no longer than 15 minutes and was followed immediately by the questionnaire.

## Results

The major dependent variable was the degree of positive attitude expressed toward computer-aided instruction. A simple scale of positiveness

was employed: a positive response (Pos.) was given a value of 3, a negative response (Neg.) was given a value of 1, and a Maybe response was given a neutral value of 2. Where relevant, the actual distribution of responses was also considered.

Overall Attitude

For each subject a mean overall attitude score (degree of positiveness) was computed by assigning a 1 to each Neg. response, a 2 to each Maybe response, and a 3 to each Pos. response, summing, and then dividing this total by the number of items responded to (there were very occasional responses omitted by members of the NE group). Table 2 presents the mean overall attitude score and standard deviation for each group. Response distributions are also shown in the Table.

The overall attitude of naive students (NE group) is slightly positive, with Maybe being the most common response. The mean attitude score for those who received the 15-minute introduction to the terminal (Exp. group) was significantly higher ($t=3.11$, $p < .01$); for this group, the majority of responses were Pos. Experience at the console appears to reduce uncertainty and make subjects more positive in their attitudes.

Specific Items and Item Categories

The 14 items in the questionnaire, of course, constitute a small subset of items that might have been used. Thus, although the overall results are of interest, there is much to be gained in an examination of responses to categories of items, and to specific items themselves.

Table 2

Percent Distribution of Responses and
Mean Overall Attitude Scores (2.00 score is neutral)
Frequencies are in parentheses.

| | Pos. | Maybe | Neg. | Mean Att. Score | S.D. |
|---|---|---|---|---|---|
| NE (N=27) | 33.2 (122) | 41.0 (151) | 25.8 (95) | 2.08 | .27 |
| Exp. (M=13) | 55.0 (100) | 26.4 (48) | 18.6 (34) | 2.36 | .26 |

It is useful to classify the items according to the following categories (see Table 1):

A. Importance of the teacher as compared to the computer: Nos. 4, 6, and 11.

B. Comparison of computer with other instructional materials: Nos. 7 and 8.

C. Rates of learning and computer use: Nos. 1, 2, and 14.

D. Use of the computer: Nos. 5, 10, 12, and 15.

E. What will the computer be like: Nos. 3 and 13.

Response distributions and mean attitude scores for each category are presented in Table 3. For purposes of statistical testing, the sums of attitude scores for each category were computed for each subject[2] and t-tests were performed on differences between group means of these sums. The response distribution and mean attitude scores for individual items are given in Table 4. Mean attitude scores for each item, grouped by category, are also presented graphically in Figure 1.

A. For neither group is the computer seen as a replacement for the teacher. Students were not at all sure that learning would necessarily be easier or better with a computer than with a teacher, although there was much uncertainty (more than half the responses to Items 4 and 6 were Maybe). The lowest scoring item for both groups was Number 11;

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[2]For example, a subject who gave a positive response to Item 7 and a negative response to Item 8 would receive a sum score of 4 for Category B.

Table 3

Percent distributions (with frequencies in parentheses) and mean attitude scores for categories of items. An attitude score of 2.00 is neutral (1.00 is max. negative, 3.00 is max. positive).

A. Comparison with teacher: Nos. 4, 6, 11

| | Pos. | M | Neg. | Mean Att. Score |
|---|---|---|---|---|
| NE | (8) 10.0 | (36) 45.0 | (36) 45.0 | 1.65 |
| Exp. | (6) 15.4 | (16) 41.0 | (17) 43.6 | 1.72 |

B. Comparison with other instructional materials: Nos. 7, 8

| | Pos. | M | Neg. | Mean Att. Score |
|---|---|---|---|---|
| NE | (18) 36.0 | (18) 36.0 | (14) 28.0 | 2.08 |
| Exp. | (15) 57.7 | (8) 30.8 | (3) 11.5 | 2.46 |

C. Rates: Nos. 1, 2, 14

| | Pos. | M | Neg. | Mean Att. Score |
|---|---|---|---|---|
| NE | (27) 33.8 | (40) 50.0 | (13) 16.2 | 2.18 |
| Exp. | (27) 69.2 | (10) 25.6 | (2) 5.1 | 2.64 |

D. Use of the computer: Nos. 5, 10, 12, 15

| | Pos. | M | Neg. | Mean Att. Score |
|---|---|---|---|---|
| NE | (40) 37.7 | (35) 33.0 | (31) 29.2 | 2.08 |
| Exp. | (32) 61.5 | (9) 17.3 | (11) 21.2 | 2.40 |

E. What will the computer be like?: Nos. 3, 13

| | Pos. | M | Neg. | Mean Att. Score |
|---|---|---|---|---|
| NE | (29) 55.8 | (22) 42.3 | (1) 1.9 | 2.54 |
| Exp. | (20) 76.9 | (5) 19.2 | (1) 3.8 | 2.73 |

Table 4

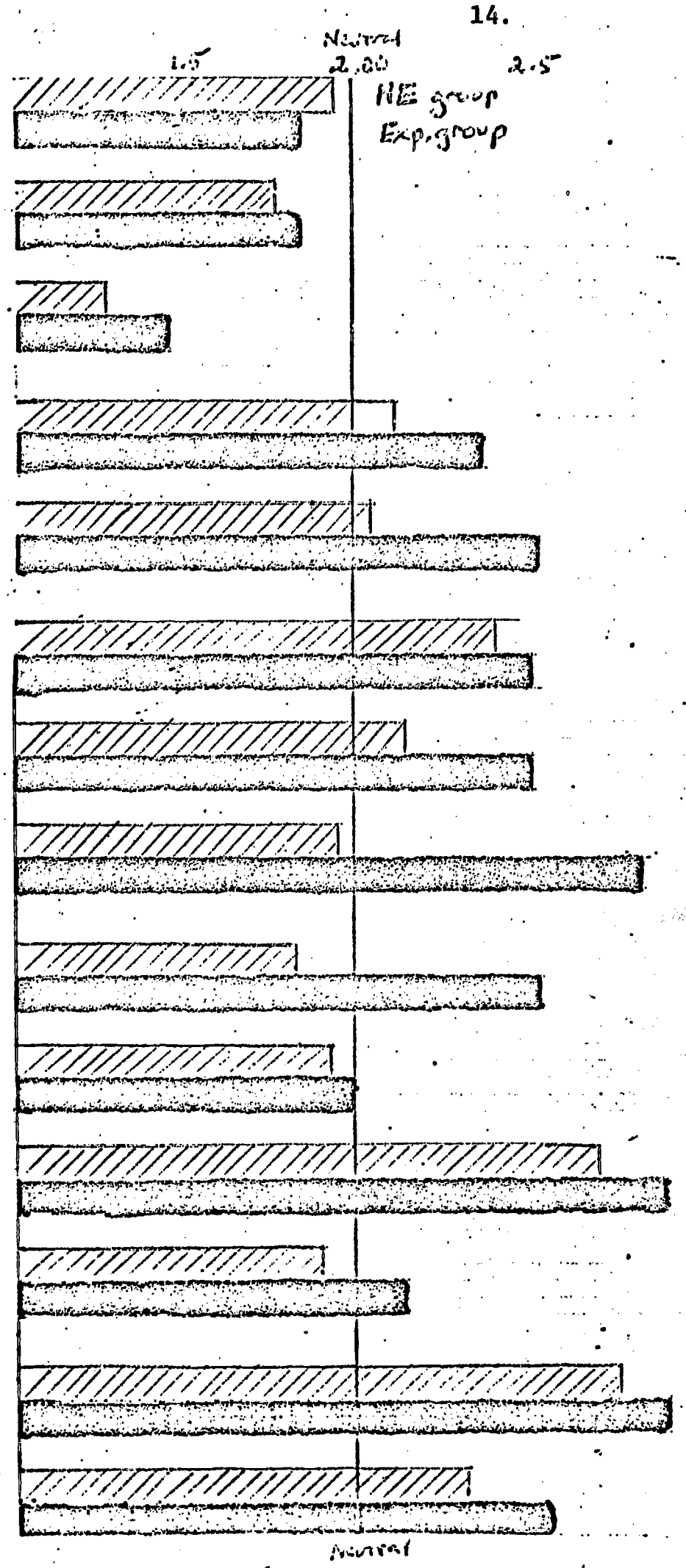
Percent distributions (frequencies in parentheses) and mean attitude scores for individual items. Attitude scores are displayed graphically in Figure 1.

| Category | Question | Group | Pos. | Maybe | Neg. | Mean Att. Scores |
|---|---|---|---|---|---|---|
| A | #4 (easier with computer than with teacher) | NE | ( 5) 18.5 | (15) 55.6 | ( 7) 25.9 | 1.93 |
| | | Exp. | ( 2) 15.4 | ( 7) 53.8 | ( 4) 30.8 | 1.85 |
| | | | 7 | 22 | 11 | |
| | #6 (I think students learn better with computer than with teacher | NE | ( 3) 11.5 | (14) 53.8 | ( 9) 34.6 | 1.77 |
| | | Exp. | ( 3) 23.1 | ( 5) 38.5 | ( 5) 38.5 | 1.85 |
| | | | 6 | 19 | 14 | |
| | #11 (I would need a teacher as I work on the computer) | NE | ( 0) 0.0 | ( 7) 25.9 | (20) 74.1 | 1.26 |
| | | Exp. | ( 1) 7.7 | ( 4) 30.8 | ( 8) 61.5 | 1.46 |
| | | | 1 | 11 | 28 | |
| B | #7 (easier to learn with computer than with films and slides) | NE | (10) 40.0 | ( 8) 32.0 | ( 7) 28.0 | 2.12 |
| | | Exp. | ( 7) 53.8 | ( 4) 30.8 | ( 2) 15.4 | 2.38 |
| | | | 17 | 12 | 9 | |
| | #8 (learn better with computer than with book) | NE | ( 8) 32.0 | (10) 40.0 | ( 7) 28.0 | 2.04 |
| | | Exp. | ( 8) 61.5 | ( 4) 30.8 | ( 1) 7.7 | 2.54 |
| | | | 16 | 14 | 8 | |
| C | #1 (learn more quickly) | NE | (11) 40.7 | (16) 59.3 | ( 0) 0.0 | 2.41 |
| | | Exp. | ( 7) 53.8 | ( 6) 46.2 | ( 0) 0.0 | 2.54 |
| | | | 18 | 22 | 0 | |
| | #2 (work at own speed) | NE | (10) 37.0 | (11) 40.7 | ( 6) 22.2 | 2.15 |
| | | Exp. | ( 9) 69.2 | ( 2) 15.4 | ( 2) 15.4 | 2.54 |
| | | | 19 | 13 | 8 | |
| | #14 (learning by computer would go too fast) | NE | ( 6) 23.1 | (13) 50.0 | ( 7) 26.9 | 1.96 |
| | | Exp. | (11) 84.6 | ( 2) 15.4 | ( 0) 0.0 | 2.85 |
| | | | 17 | 15 | 7 | |

(contd.)

| Category | Question | Group | Pos. | Maybe | Neg. | Mean Att. Scores |
|---|---|---|---|---|---|---|
| D | #5 (would like sitting and working alone) | NE | ( 8) 30.8 | ( 5) 19.2 | (13) 50.0 | 1.81 |
| | | Exp. | ( 9) 69.2 | ( 2) 15.4 | ( 2) 15.4 | 2.54 |
| | | | 17 | 7 | 15 | |
| | #10 (I'm afraid I could not learn how to use computer very well) | NE | ( 5) 18.5 | (15) 55.6 | ( 7) 25.9 | 1.93 |
| | | Exp. | ( 5) 38.5 | ( 3) 23.1 | ( 5) 38.5 | 2.00 |
| | | | 10 | 18 | 12 | |
| | #12 (I would like to use a computer) | NE | (19) 73.1 | ( 7) 25.9 | ( 0) 0.0 | 2.73 |
| | | Exp. | (12) 92.3 | ( 1) 7.7 | ( 0) 0.0 | 2.92 |
| | | | 31 | 8 | 0 | |
| | #15 (I would not mind missing a question since no one would be watching me) | NE | ( 8) 29.6 | ( 8) 29.6 | (11) 40.7 | 1.89 |
| | | Exp. | ( 6) 46.2 | ( 3) 23.1 | ( 4) 30.8 | 2.15 |
| | | | 14 | 11 | 15 | |
| E | #3 (working by computer would be interesting) | NE | (20) 76.9 | ( 6) 23.1 | ( 0) 0.0 | 2.77 |
| | | Exp. | (12) 92.3 | ( 1) 7.7 | ( 0) 0.0 | 2.92 |
| | | | 32 | 7 | 0 | |
| | #13 (using a computer would be like having a friendly teacher) | NE | ( 9) 34.6 | (16) 61.5 | ( 1) 3.8 | 2.31 |
| | | Exp. | ( 8) 61.5 | ( 4) 30.8 | ( 1) 7.7 | 2.54 |
| | | | 17 | 20 | 2 | |

Table 4 (contd.)




Comparison with teacher:

4. It would be easier to learn by computer than with a teacher.

6. I think students learn better by computer than with a teacher.

11. I would need a teacher as I work on the computer.

Comparison with other instructional materials:

7. It would be easier to learn by computer than with films and slides.

8. I think students learn better by computer than with a book.

Rates:

1. I would learn more quickly by using the computer.

2. I could work at my own speed on the computer.

14. Learning by computer would go too fast.

Use of the computer:

5. I would like sitting and ow working alone.

10. I'm afraid I could not learn how to use a computer very well.

12. I would like to use a computer.

15. I would not mind if I missed a question while working on a computer....

What will the computer be like?

3. It would be interesting to work by computer.

13. Using a computer would be like having a friendly teacher.

Fig. 1. Mean attitude scores for individual items (arranged by category). Striped bars = NE group; filled bars = Exp. group.

only one student out of the 40 was sure that he would not need a teacher as he worked on the computer. The effect of the orientation did not significantly affect attitudes in this category (t=0.24).

B. When asked to compare the probable effectiveness of the computer with other, more traditional, instructional media, the NE group's attitude was slightly positive. For the category as a whole, the orientation improved attitudes (t=1.67, $p$=.05, one-tailed), but this improvement was larger for Item 8 (computer compared with book) than for Item 7 (computer compared with films and slides). Only the former difference was significant by a Chi-square test ($\chi^2$=3.06, $p$<.05, one-tailed).

C. The items in this category (1, 2, and 14) have to do with rates of learning (Item 1) and of work (2 and 14). The overall attitudes of both groups were positive, but the orientation had a significant effect in improving attitudes (t=2.98, $p$<.01). Two-thirds of the NE responses were uncertain or negative for this category, whereas less than a third of Exp. responses were not clearly positive.

The difference between groups is actually largest for Items 2 and 14, which ask for student intuitions concerning the working speed required by the computer. (The small difference on Item 1 is not significant; even naive students believe that it is likely that they will learn quickly on the computer.) On Item 2 (I could work at my own speed on the computer), the difference is only slightly significant ($\chi^2$= 3.65, $p$<.05, one-tailed), but for Item 14 (Learning by computer would go too fast), the change in attitude is dramatic, going from slightly less than neutral for NE subjects to strongly positive for